Radians

Figure 1

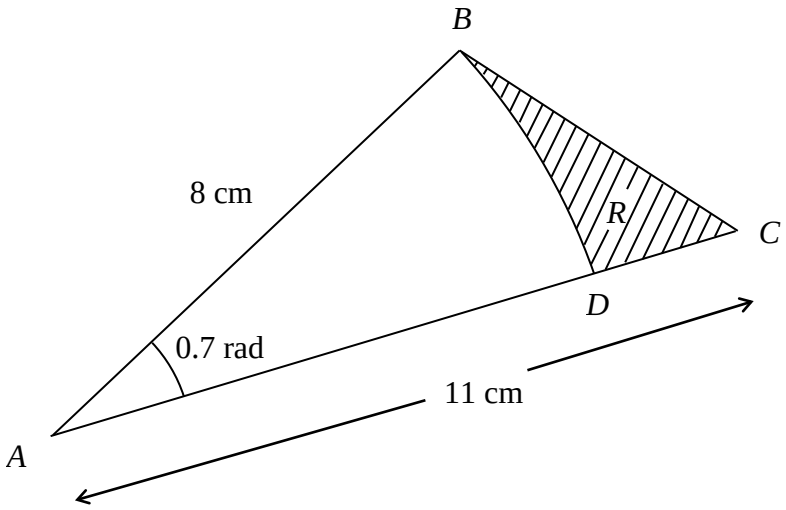


Figure 1 shows the triangle *ABC*, with *AB* = 8 cm, *AC* = 11 cm and $\angle BAC = 0.7$ radians. The arc *BD*, where *D* lies on *AC*, is an arc of a circle with centre *A* and radius 8 cm. The region *R*, shown shaded in Figure 1, is bounded by the straight lines *BC* and *CD* and the arc *BD*.

Find

(*a*) the length of the arc *BD*,

(2)

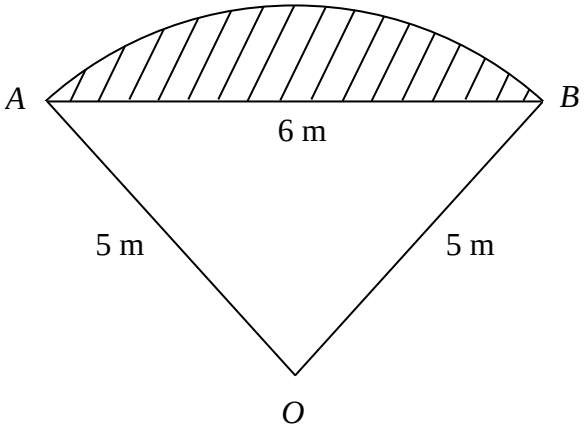
(*b*) the perimeter of *R*, giving your answer to 3 significant figures,

(4)

(*c*) the area of *R*, giving your answer to 3 significant figures.

(5)

Figure 2



In Figure 2 *OAB* is a sector of a circle, radius 5 m. The chord *AB* is 6 m long.

(*a*) Show that $\cos A\hat{O}B = \frac{7}{25}$.

(2)

(*b*) Hence find the angle $A\hat{O}B$ in radians, giving your answer to 3 decimal places.

(1)

(*c*) Calculate the area of the sector *OAB*.

(2)

(*d*) Hence calculate the shaded area.

(3)

Figure 2

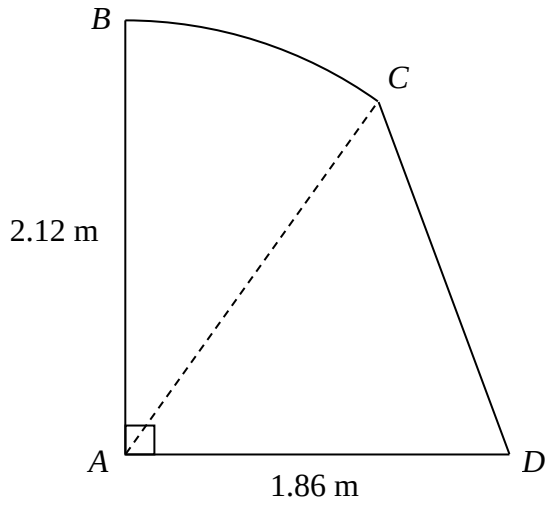


Figure 2 shows the cross-section *ABCD* of a small shed.

The straight line *AB* is vertical and has length 2.12 m.

The straight line *AD* is horizontal and has length 1.86 m.

The curve *BC* is an arc of a circle with centre *A*, and *CD* is a straight line.

Given that the size of $\angle BAC$ is 0.65 radians, find

(*a*) the length of the arc *BC*, in m, to 2 decimal places,

(2)

(*b*) the area of the sector *BAC*, in m^2, to 2 decimal places,

(2)

(*c*) the size of $\angle CAD$, in radians, to 2 decimal places,

(2)

(*d*) the area of the cross-section *ABCD* of the shed, in m^2, to 2 decimal places.

(3)

Figure 2

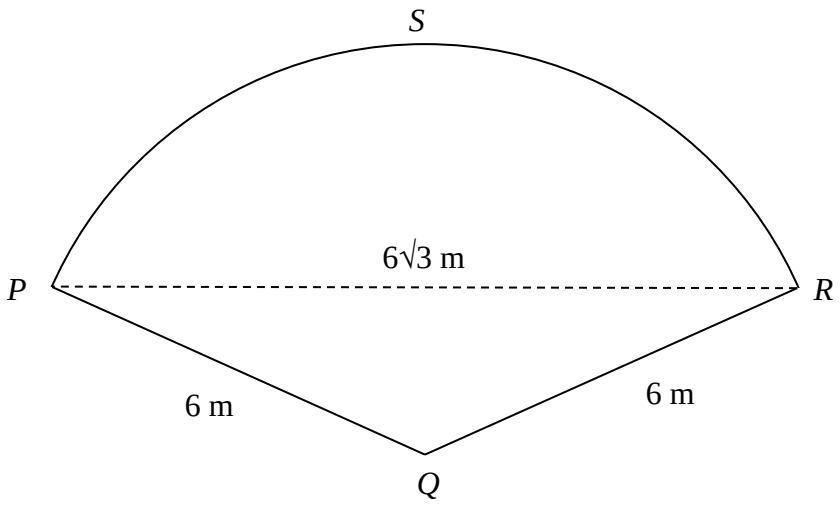


Figure 2 shows a plan of a patio. The patio *PQRS* is in the shape of a sector of a circle with centre *Q* and radius 6 m.

Given that the length of the straight line *PR* is $6\sqrt{3}$ m,

(*a*) find the exact size of angle *PQR* in radians.

(3)

(*b*) Show that the area of the patio *PQRS* is $12\pi\,\text{m}^2$.

(2)

(*c*) Find the exact area of the triangle *PQR*.

(2)

(*d*) Find, in m^2 to 1 decimal place, the area of the segment *PRS*.

(2)

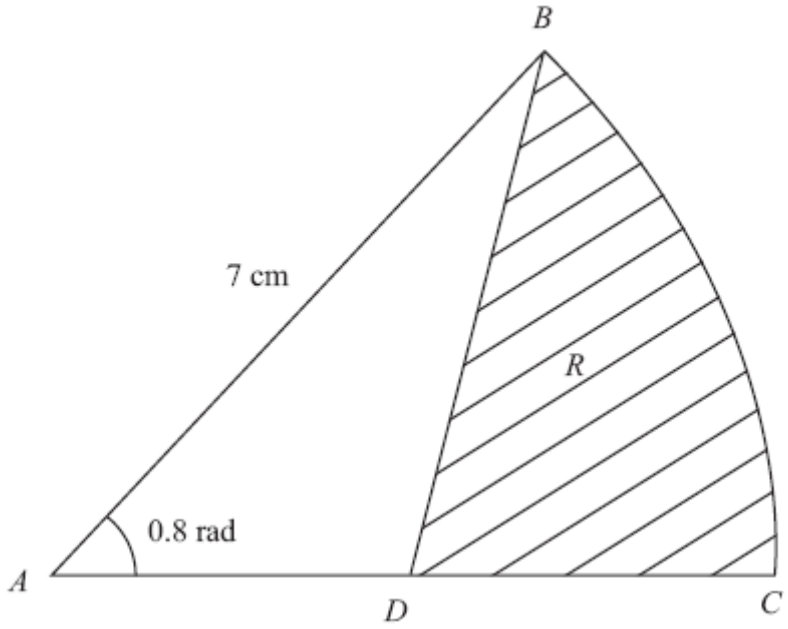


Figure 1

Figure 1 shows *ABC*, a sector of a circle with centre *A* and radius 7 cm.

Given that the size of $\angle BAC$ is exactly 0.8 radians, find

(*a*) the length of the arc *BC*,

(2)

(*b*) the area of the sector *ABC*.

(2)

The point *D* is the mid-point of *AC*. The region *R*, shown shaded in Figure 1, is bounded by *CD*, *DB* and the arc *BC*.

Find

(*c*) the perimeter of *R*, giving your answer to 3 significant figures,

(4)

(*d*) the area of *R*, giving your answer to 3 significant figures.

(4)

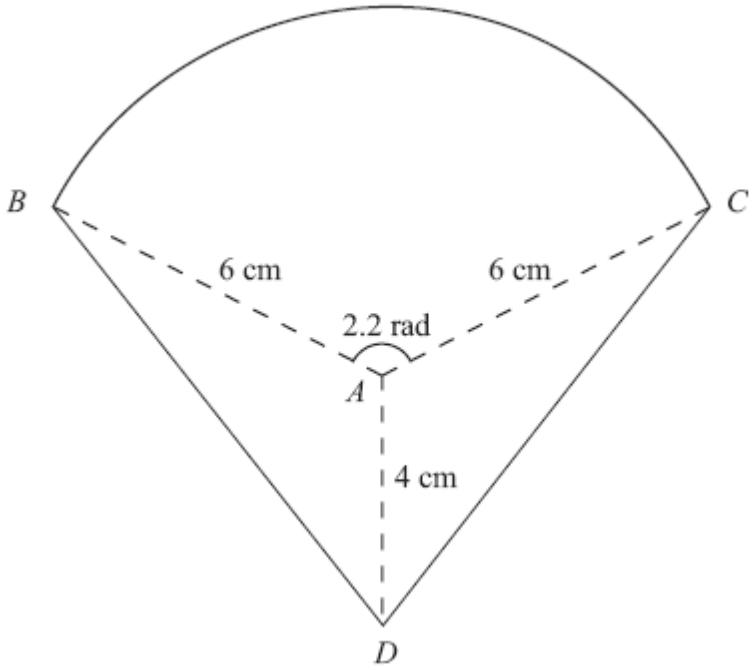


Figure 3

The shape *BCD* shown in Figure 3 is a design for a logo.

The straight lines *DB* and *DC* are equal in length. The curve *BC* is an arc of a circle with centre *A* and radius 6 cm. The size of $\angle BAC$ is 2.2 radians and $AD = 4$ cm.

Find

(*a*) the area of the sector *BAC*, in cm^2,

(2)

(*b*) the size of $\angle DAC$, in radians to 3 significant figures,

(2)

(*c*) the complete area of the logo design, to the nearest cm^2.

(4)

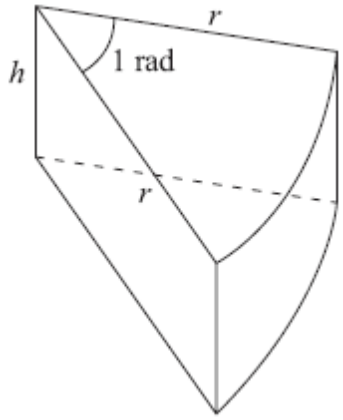


Figure 2

Figure 2 shows a closed box used by a shop for packing pieces of cake. The box is a right prism of height h cm. The cross section is a sector of a circle. The sector has radius r cm and angle 1 radian.

The volume of the box is 300 cm^3.

(a) Show that the surface area of the box, S cm^2, is given by

$$S = r^2 + \frac{1800}{r}.$$

(5)

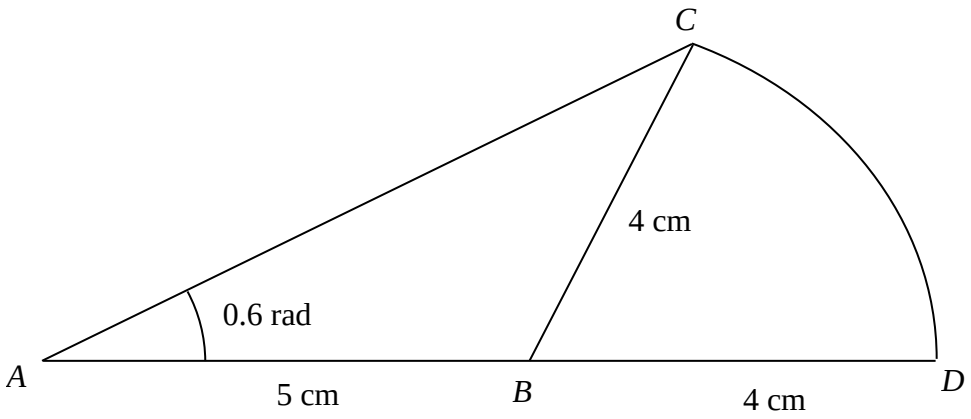


Figure 1

An emblem, as shown in Figure 1, consists of a triangle ABC joined to a sector CBD of a circle with radius 4 cm and centre B. The points A, B and D lie on a straight line with AB = 5 cm and BD = 4 cm. Angle BAC = 0.6 radians and AC is the longest side of the triangle ABC.

(a) Show that angle ABC = 1.76 radians, correct to three significant figures.

(4)

(b) Find the area of the emblem.

(3)

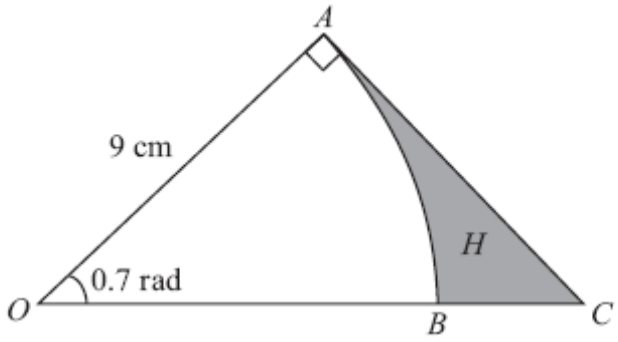


Figure 1

Figure 1 shows the sector *OAB* of a circle with centre *O*, radius 9 cm and angle 0.7 radians.

(*a*) Find the length of the arc *AB*.

(2)

(*b*) Find the area of the sector *OAB*.

(2)

The line *AC* shown in Figure 1 is perpendicular to *OA*, and *OBC* is a straight line.

(*c*) Find the length of *AC*, giving your answer to 2 decimal places.

(2)

The region *H* is bounded by the arc *AB* and the lines *AC* and *CB*.

(*d*) Find the area of *H*, giving your answer to 2 decimal places.

(3)

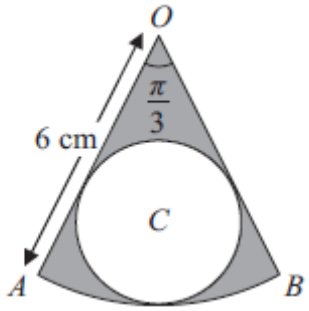


Figure 1

The shape shown in Figure 1 is a pattern for a pendant. It consists of a sector *OAB* of a circle centre *O*, of radius 6 cm, and angle $AOB = \frac{\pi}{3}$. The circle *C*, inside the sector, touches the two straight edges, *OA* and *OB*, and the arc *AB* as shown.

Find

(*a*) the area of the sector *OAB*, **(2)**

(*b*) the radius of the circle *C*.

(3)

The region outside the circle *C* and inside the sector *OAB* is shown shaded in Figure 1.

(*c*) Find the area of the shaded region.

(2)